What is claimed is:

1. A method of determining the appropriate size of a prosthesis to be implanted into an intervertebral disc space comprising:

   (a) making an image of the endplates of the vertebral bodies that are adjacent said target disc space;

   (b) determining the smaller surface area endplate from said image ; and

   (c) selecting a prosthesis size that will substantially cover the endplate having the smaller surface area.

2. The method of claim 1 wherein said image is a radiograph, computed tomography scan, or magnetic resonance image scan.

3. The method of claim 1 wherein said image comprises anterior-posterior views of said endplates.

4. The method of claim 1 wherein the size of said prosthesis is selected by using a template that scales an image of various prosthesis sizes to the skeletal imaging magnification factor resulting from making the image of the endplates.

5. The method of claim 4 wherein the size of said prosthesis is selected by placing the best fit template over the image of the endplate having the smallest surface area.

6. The method of claim 1 wherein said prosthesis size is selected from a plurality of substantially circular prosthesis diameters ranging from approximately 12 mm to approximately 20 mm.

7. The method of claim 6 wherein said plurality comprises prosthesis diameters ranging from approximately 14 mm to approximately 18 mm.

8. The method of claim 1 wherein the size of said prosthesis is selected such that when the prosthesis is positioned within the disc space the posterior margin of the

prosthesis is positioned at least 1 mm anterior to the posterior margin of each adjacent vertebral body endplate.

9. The method of claim 8 wherein said prosthesis is positioned such that its anterior margin is substantially tangent to the anterior surface of the anteriorly superior vertebral body.

10. A method of determining the appropriate size of a prosthesis to be implanted into an intervertebral disc space comprising:

(a) making an image of the endplates of the vertebral bodies adjacent said target disc space;

(b) determining the endplate with the smaller surface area from said image ;

(c) placing a template over the image of the smaller endplate, wherein said template comprises images of a plurality of prostheses sizes that are scaled to correspond to the magnification resulting from creation of the image of the endplates; and

(d) selecting a prosthesis size from said plurality of sizes shown on said template, wherein when said prosthesis size on the template is positioned such that its edge is substantially tangent to the image of the anterior margin of the anteriorly superior vertebral body, the posterior edge of the prosthesis is positioned at least 1 mm anterior to the posterior edge of the endplate.

11. A method of preparing an intervertebral disc space of a patient to receive a prosthesis, comprising:

(a) positioning a patient;

(b) immobilizing the patient's spine;

(c) making a lateral image of the patient's spine in the area of the target intervertebral space with a direction indicator visible on the image;

(d) locating a reference line on said image that approximates the preferred positioning of the prosthesis;

(e) determining the angle between the direction indicator and the reference line;

(f) using such angle to position an instrument relative to the target disc space or its adjacent vertebral body endplates;

(g) using said instrument to prepare the target disc space to receive the prosthesis.

12. The method of claim 11 wherein said instrument is a machining fixture used to guide a machining element into the target disc space to prepare the disc space or the endplates to receive the prosthesis.

13. The method of claim 11 wherein said instrument is a machining element used to prepare the disc space or the endplates to receive the prosthesis.

14. The method of claim 11 wherein the positioning the patient comprises:

(a) placing the patient supine on an operating table in the anterior-posterior position with the head supported;

(b) positioning the patient's neck so that it is relatively parallel to the table;

(c) attempting to position the patient's cervical vertebrae to approximate its neutral position, and

(d) attempting to position the patient's spinous processes to be approximately midway between the facets as shown on an anterior-posterior image of the spine.

15. The method of claim 14 wherein said patient is positioned such that the patient's cervical vertebrae are not positioned in their neutral position, and the patient's spinous processes are not midway between the facets on the anterior-posterior image of the spine.

16. The method of claim 14 wherein the neutral position of the spine is the post-operative position that the spine assumes when the patient is standing without any flexion or extension.

17. The method of claim 16 wherein the neutral position of the spine is approximated by the spine's preoperative position when the patient is standing without any flexion or extension.

18. The method of claim 14 wherein the neutral position of the spine is the approximate midpoint between preoperative full flexion and full extension of the spine while the patient is standing.

19. The method of claim 11 wherein the positioning the patient comprises attempting to position the patient so that the patient's cervical vertebrae approximates its neutral position, wherein the neutral position of the spine is approximated by extrapolating the pre-operative curvature of the spine at healthy spine levels to the curvature at non-healthy levels.

20. The method of claim 11 wherein said patient is immobilized using surgical tape.

21. The method of claim 11 wherein the patient's head is placed on a torus-shaped pad, and the patient's chin is extended in order to more closely position the cervical vertebrae in its neutral position.

22. The method of claim 11 wherein said direction indicator indicates the direction of the gravitational force.

23. The method of claim 11 wherein said reference line is a line normal to a line connecting the posterior inferior edge of the vertebral body caudal to the disc

space and the posterior superior edge of the vertebral body cephalad to the disc space.

24. The method of claim 11 wherein said angle is determined using a vertebral body orientation measuring tool that is a goniometer or a protractor.

25. The method of claim 24 wherein said goniometer comprises a first arm and a second arm that are movable relative to one another, and further comprises indicia; whereby said angle is determined by:

(a) positioning said first arm such that it is parallel to the image of said direction indicator ,

(b) positioning said second arm such that it is parallel to a line connecting the posterior inferior edge of the caudal vertebral body and the posterior superior edge of the cephalad vertebral body, and

(c) reading said angle from said indicia.

26. The method of claim 25 wherein said indicia indicate the angle between said direction indicator and a line normal to said line connecting the posterior inferior edge of the caudal vertebral body and the posterior superior edge of the cephalad vertebral body.

27. Apparatus for positioning a subject comprising:

(a) an image producer for producing an image of tissue that is beneath the subject's skin surface;

(b) a gravity direction indicator mounted within the field of view of the image producer, wherein said gravity direction indicator is made from a material that is visible on images produced by the image producer.

28. The apparatus of claim 27 wherein the gravity direction indicator is removably mounted within the field of view of the image producer.

29. The apparatus of claim 28 wherein the gravity indicator is mounted at least partially within a housing that allows the indicator's position relative to the housing to change as the orientation of the housing relative to gravity changes.

30. The apparatus of claim 29 wherein the gravity direction indicator is mounted between two interconnected shells , wherein the space between the two shells has a depth greater than the depth of the gravity direction indicator .

31. The apparatus of claim 27 wherein the image producer is a radiographic image producer and the gravity direction indicator comprises a radio-opaque pendulum.

32. The apparatus of claim 27 wherein the gravity indicator is weight and the gravity direction indicator is pivotably mounted within the field of view of the image producer.

33. Apparatus for positioning a subject comprising:

(a) a radiographic image producer;

(b) a subject holding apparatus for positioning the subject within the field of view of the image producer; and

(c) a gravity direction indicator removably mounted within the field of view of the image producer, wherein said gravity indicator comprises a weighted radio-opaque pendulum pivotably mounted within at least a partial housing such that the indicator's position within the housing will change as the orientation of the housing relative to gravity changes.

34. A method of implanting an intervertebral disc prosthesis into a patient's disc space defined by two opposing endplates, wherein said prosthesis comprises two opposing articulating members and said prosthesis has a neutral position defined by the midpoint of its range of motion, said method comprising:

(a) determining the position of a first target endplate when the spine is in its neutral position;

(b) securing the patient in position for implantation;

(c) determining the position of said first endplate after the patient's position is secured;

(d) forming a first cavity within said first target endplate, wherein said first cavity is positioned such that when one of the opposing articulating members is positioned within the first cavity the prosthesis substantially assumes its neutral position when the patient's spine assumes its neutral position.

35. The method of claim 34 further comprising positioning the patient prior to securing the patient's position such that the spine approximates its neutral position.

36. The method of claim 34 further comprising distracting the vertebra adjacent the target disc space after the patient's position is secured, and wherein the determining the position of the first target endplate following the positioning of the patient is done after said distracting.

37. The method of claim 34 further comprising:

(a) determining the position of a second target endplate when the spine is in its neutral position;

(b) determining the position of said second target endplate following securing the patient's position; and

(c) forming a second cavity within said second target endplate.

38. The method of claim 37 further comprising positioning a first of said opposing articulating members within said first cavity and positioning a second of said opposing articulating members within said second cavity.

39. The method of claim 38 wherein the size and shape of said first and second cavities substantially compliments and corresponds to the size and shape of an outer surface of said first and second opposing articulating members, respectively.

40. The method of claim 38 wherein said first and second cavities are positioned such that when the opposing articulating members are positioned therein and when the spine assumes its neutral position, the opposing articulating members are substantially parallel to one another.

41. The method of claim 34 wherein the determining the position of said first target endplate when the spine is in its neutral position comprises determining a first angle that is the angle of said first target endplate relative to a reference plane when the spine is in its neutral position, and wherein said first cavity is formed at an angle relative to said reference plane that is substantially equal to said first angle.

42. The method of claim 41 wherein said reference plane is the plane of the target disc space extending in the anterior-posterior and lateral directions.

43. The method of claim 34 wherein the determining the position of said first target endplate comprises:

(a) determining a first angle that is the angle of said first target endplate relative to a reference plane when the spine is in its neutral position; and

(b) determining a second angle that is the angle of said first target endplate relative to said reference plane following securing the patient's position.

44. The method of claim 43 wherein said first cavity is formed at an angle relative to said reference plane that is substantially equal to said first angle.

45. The method of claim 44 wherein said reference plane is the plane of the target disc space extending in the anterior-posterior and lateral directions.

46. The method of claim 34 wherein the neutral position of the spine is the post-operative position that the spine assumes when the patient is standing without any flexion or extension.

47. The method of claim 46 wherein the neutral position of the spine is approximated by the spine's preoperative position when the patient is standing without any flexion or extension.

48. The method of claim 34 wherein the neutral position of the spine is the approximate preoperative midpoint between full flexion and full extension of the spine while the patient is standing.

49. The method of claim 34 wherein said neutral position of the spine is approximated by extrapolating the pre-operative curvature of the spine at healthy spine levels to the curvature at non-healthy levels.

50. The method of claim 49 wherein said non-healthy levels comprise levels wherein the disc or the vertebra is degenerated and includes fused levels.

51. The method of 49 wherein said extrapolation is based on the formula:

$$\theta_x = \left[\left(\frac{y-x}{y-z}\right)\left(\theta_z - \theta_y\right)\right] + \theta_y$$

wherein θ represents the angle of a spinal anatomical plane relative to a reference plane, and x, y and z represent levels of the vertebrae wherein level x is between levels y and z, and level x is cephalad to level y.

52. The method of claim 51 wherein said spinal anatomical plane is a plane of an anatomical element selected from the group consisting of an anterior surface of a

vertebral body, a posterior surface of a vertebral body, a caudal surface of a vertebral body, a cephalad surface of a vertebral body, a disc, or a disc space.

53. The method of 51 wherein said reference plane is the spinal anatomical plane at level y and the extrapolation is based on the formula:

$$\theta_x = \left[\left(\frac{y-x}{y-z}\right)(\theta_z - \theta_y)\right]$$

54. A method of implanting an intervertebral disc prosthesis into a patient's disc space defined by first and second endplates, wherein said prosthesis comprises first and second articulating members, said method comprising:

(a) determining a first angle (α) that is the angle of the first target endplate relative to a reference plane when the spine is in its neutral position;

(b) securing the patient's position;

(c) determining a second angle (β) that is the angle of said first target endplate relative to said reference plane after the patient's position is secured;

(d) forming a first cavity within said first target endplate by inserting a machining element into the target disc space and bringing the machining element into contact with the first endplate, wherein the angle of the machining element upon insertion relative to the reference plane is equal to $\beta - \alpha + \delta$, wherein δ is equal to any rotation of the machining element that is needed to bring the machining element into contact with the first endplate; and

(e) positioning said first articulating member within said first cavity.

55. The method of claim 54 further comprising attempting to position the patient so that the patient's cervical vertebrae approximate their neutral positions prior to securing the patient's position.

56. The method of claim 54 further comprising distracting the vertebra adjacent the target disc space after the patient's position is secured, and wherein the determining the second angle is done after said distracting.

57. The method of claim 54 wherein said machining element is rotatably mounted on a handle, and the angle of the machining element upon insertion relative to the reference plane is set by adjusting the angle of the machining element relative to said handle.

58. The method of claim 57 wherein said machining element is inserted into the target disc space such that the handle is parallel to said reference plane.

59. The method of claim 58 wherein said reference plane is the plane of the target disc space extending in the anterior-posterior and lateral directions.

60. The method of claim 54 wherein said machining element is brought into contact with said first endplate through translational motion and $\delta = 0$.

61. The method of claim 54 wherein said target disc space is in the cervical spine and the angle of the machining element upon insertion relative to the reference plane is between about $0° + \delta$ and about $10° + \delta$.

62. The method of claim 61 wherein said target disc space is in the cervical spine and the angle of the machining element upon insertion relative to the reference plane is between about $3° + \delta$ and about $5° + \delta$.

63. The method of claim 62 wherein the angle of the machining element upon insertion relative to the reference plane is about $4° + \delta$.

64. The method of claim 54 wherein said target disc space is in the cervical spine and the angle of the machining element upon insertion relative to the reference plane is between about 6° and about 8°.

65. The method of claim 64 wherein the angle of the machining element upon insertion relative to the reference plane is about 7°.

66. The method of claim 54 further comprising:

(a) determining a third angle (α') that is the angle of the second target endplate relative to said reference plane when the spine is in its neutral position;

(b) determining a fourth angle (β') that is the angle of the second target endplate relative to said reference plane following securing the patient's position;

(c) forming a second cavity within said second target endplate by inserting a machining element into the target disc space and bringing the machining element into contact with the second endplate, wherein the angle of the machining element upon insertion relative to the reference plane is equal to $\beta' - \alpha' + \delta'$, wherein δ' is equal to any rotation of the machining element that occurs in bringing the machining element into contact with the second endplate; and

(d) positioning said second articulating member within said second cavity.

67. The method of claim 66 wherein the size and shape of said first and second cavities substantially compliments and corresponds to the size and shape of an outer surface of said first and second opposing articulating members, respectively.

68. The method of claim 66 wherein said first and second cavities are positioned such that when the opposing articulating members are positioned therein and

when the spine assumes its neutral position, the opposing articulating members are substantially parallel to one another.

69. The method of claim 66 wherein said first and second cavities are positioned such that when the opposing articulating members are positioned therein and when the spine assumes its neutral position, the opposing articulating members are substantially positioned at the midpoint of their range of motion.

70. The method of claim 54 wherein said first cavity is formed at an angle relative to said reference plane that is substantially equal to said first angle.

71. The method of claim 66 wherein said first cavity is formed at an angle relative to said reference plane that is substantially equal to said first angle, and said second cavity is formed at an angle relative to said reference plane that is substantially equal to said third angle.

72. A method of implanting an intervertebral disc prosthesis into a target disc space defined by first and second target endplates, wherein said prosthesis comprises first and second articulating members, said method comprising:

(a) determining a first angle that is the angle of the first target endplate relative to a reference plane when the spine is in its neutral position;

(b) determining a second angle that is the angle of the second target endplate relative to said reference plane when the spine is in its neutral position;

(c) forming a first cavity within said first target endplate;

(d) forming a second cavity within said second target endplate; and

(e) positioning said first articulating member within said first cavity and positioning said second articulating member within said second cavity such that the angle of said first articulating member relative to the reference plane is equal to said first angle and the angle of said second

articulating member relative to said reference plane is equal to said second angle.

73. The method of claim 72 wherein the position of the first articulating member is defined by a first plane and the position of the second articulating member is defined by a second plane, wherein said first and second planes are substantially parallel when the first and second members are positioned at the midpoint of their range of articulation.

74. The method of claim 72 wherein said first cavity is formed at an angle relative to said reference plane that is equal to said first angle and said second cavity is formed at an angle relative to said reference plane that is equal to said second angle.

75. The method of claim 72 wherein the size and shape of said first and second cavities substantially compliments and corresponds to the size and shape of an outer surface of said first and second opposing articulating members, respectively.

76. The method of claim 72 wherein said reference plane is the plane of the target disc space extending in the anterior-posterior and lateral directions.

77. The method of claim 72 wherein the neutral position of the spine is the post-operative position that the spine assumes when the patient is standing without any flexion or extension.

78. The method of claim 77 wherein the neutral position of the spine is approximated by the spine's preoperative position when the patient is standing without any flexion or extension.

79. The method of claim 72 wherein the neutral position of the spine is the approximate preoperative midpoint between full flexion and full extension of the spine while the patient is standing.

80. The method of claim 72 wherein said neutral position of the spine is approximated by extrapolating the pre-operative curvature of the spine at healthy spine levels to the curvature at non-healthy levels.

81. The method of claim 80 wherein said non-healthy levels comprises levels wherein the disc or the vertebra is degenerated and includes fused levels.

82. The method of 80 wherein said extrapolation is based on the formula:

$$\theta_x = \left[\left(\frac{y-x}{y-z}\right)\left(\theta_z - \theta_y\right)\right] + \theta_y$$

wherein θ represents the angle of a spinal anatomical plane relative to a reference plane, and x, y and z represent levels of the vertebrae wherein level x is between levels y and z, and level x is cephalad to level y.

83. The method of 82 wherein said spinal anatomical plane is a plane of an anatomical element selected from the group consisting of an anterior surface of a vertebral body, a posterior surface of a vertebral body, a caudal surface of a vertebral body, a cephalad surface of a vertebral body, a disc, or a disc space.

84. The method of 82 wherein said reference plane is the spinal anatomical plane at level y and the extrapolation is based on the formula:

$$\theta_x = \left[\left(\frac{y-x}{y-z}\right)\left(\theta_z - \theta_y\right)\right]$$

85. A method of implanting an intervertebral disc prosthesis into a target disc space defined by first and second target endplates, wherein said prosthesis comprises first and second opposing articulating members, said method comprising:

(a) determining a first angle (α) that is the angle of the first target endplate relative to a reference plane when the spine is in its neutral position;

(b) determining a second angle (α') that is the angle of the second target endplate relative to said reference plane when the spine is in its neutral position prior to positioning the patient for surgery;

(c) securing the patient in position for implantation;

(d) determining a third angle (β) that is the angle of said first target endplate relative to said reference plane after the patient's position is secured;

(e) determining a fourth angle (β') that is the angle of the second target endplate relative to said reference plane following securing the patient's position;

(f) forming a first cavity within said first endplate by inserting a machining element into the target disc space and bringing the machining element into contact with the first endplate, wherein the angle of the machining element upon insertion relative to the reference plane is equal to $\beta - \alpha + \delta$, wherein δ is equal to any rotation of the machining element that occurs in bringing the machining element into contact with the first endplate, whereby the angle of said first cavity relative to said reference plane is equal to said first angle;

(g) forming a second cavity within said second endplate by inserting a machining element into the target disc space and bringing the machining element into contact with the second endplate, wherein the angle of the machining element upon insertion relative to the reference plane is equal to $\beta' - \alpha' + \delta'$, wherein δ' is equal to any rotation of the machining element that occurs in bringing the machining element into contact with the second endplate, whereby the angle of said second cavity relative to said reference plane is equal to said second angle; and

(h) positioning said first articulating member within said first cavity and positioning said second articulating member within said second cavity.

86. The method of claim 85 wherein said machining element is rotatably mounted on a handle, and the angle of the machining element upon insertion relative to the reference plane is set by adjusting the angle of the machining element relative to said handle.

87. The method of claim 85 wherein a machining fixture is used to guide the machining element into the target disc space, and the angle of the machining element upon insertion relative to the reference plane is set by adjusting the angle of the machining fixture relative to the reference plane.

88. The method of claim 85 wherein said machining element is rotatably mounted on a handle, and wherein a machining fixture is used to guide the machining element into the target disc space, whereby the angle of the machining element upon insertion relative to the reference plane is set by a combination of adjusting the angle of the machining element relative to said handle and adjusting the angle of the machining fixture relative to the reference plane.

89. A method of implanting a intervertebral disc prosthesis into a target disc space defined by first and second target endplates, wherein said prosthesis comprises first and second articulating members, said method comprising:

(a) forming a first cavity within said first target endplate by inserting a machining element into the target disc space and bringing the machining element into contact with the first endplate, wherein the angle of the machining element upon insertion relative to the target disc space is between about 0° and about 13°;

(b) forming a second cavity within said second target endplate by inserting a machining element into the target disc space and bringing the

machining element into contact with the second endplate, wherein the angle of the machining element upon insertion relative to the target disc space is between about 0° and about 13°; and

(c) inserting the first articulating member into said first cavity and inserting the second articulating member into said second cavity.

90. The method of claim 89 wherein the insertion angle of said machining element prior to forming both said first and second cavities is about between about 6° and about 8°.

91. The method of claim 89 wherein the insertion angle of said machining element prior to forming both said first and second cavities is about 7°.

92. A method of implanting a intervertebral disc prosthesis into a target disc space defined by first and second target endplates, wherein said prosthesis comprises first and second articulating members, said method comprising:

(a) forming a first cavity within said first target endplate, wherein said first cavity is positioned substantially at a first angle relative to the target disc space of between about 0° and about 10°;

(b) forming a second cavity within said second target endplate, wherein said second cavity is positioned substantially at a second angle relative to the target disc space of between about 0° and about 10°; and

(c) inserting the first articulating member into said first cavity and inserting the second articulating member into said second cavity.

93. The method of claim 92 wherein said first and second angles are each independently between about 3° and about 5°.

94. The method of claim 92 wherein said first and second angles are each about 4°.

95. A system for positioning and stabilizing surgical instruments, comprising:

(a) a substantially horizontal rectangular open frame adapted to be positioned over an operating area and to support surgical instruments, having two substantially horizontal lateral side portions, a substantially horizontal cephalad portion, and a substantially horizontal caudal portion;

(b) two laterally extending side arms, each having a proximal end adapted to connect to at least one side of the open frame and a distal end adapted to connect to a vertically extending rod;

(c) two vertically extending rods, each having a proximal end adapted to connect to one distal end of a side arm, and a distal end adapted to be engaged by a clamp;

(d) two clamps, each adapted to releasably engage one distal end of a vertically extending rod and releasably engaging a rail or rail extension of an operating table.

96. The system of claim 95, wherein at least one of the vertically extending rods further comprises a vertical offset.

97. The system of claim 95, wherein the substantially horizontal rectangular open frame and the two laterally extending side arms form a single integral piece.

98. The system of claim 95, wherein the proximal ends of the two laterally extending side arms connect to the substantially horizontal rectangular open frame by tightening correspondingly threaded male and female portions together.

99. The system of claim 95, wherein the distal ends of the laterally extending side arms connect to the proximal ends of the vertically extending rods by tightening correspondingly threaded male and female portions together.

100. The system of claim 95, further comprising two rail extension, each adapted to releasably engage a side rail of an operating table and to be releasably engaged by one of the clamps.

101. The system of claim 95, further comprising a tissue retractor, wherein the tissue retractor comprises a blade and a rigid blade holder adapted to be releasably clamped to the lateral side portions, the cephalad portion, or the caudal portion of the substantially horizontal rectangular open frame.

102. The system of claim 101, wherein the blade comprises a retracting portion and a connecting portion, and is detachable from the rigid handle by disengaging the connecting portion therefrom.

103. The system of claim 101, wherein the rigid blade holder comprises an arm having a lockable joint.

104. The system of claim 95, further comprising an instrument brace, wherein the instrument brace comprises at least one rigid support having distal end adapted to be releasably attached to the substantially horizontal rectangular open frame and a proximal end adapted to be rigidly attached to at least one connector adapted to releasably and securely hold an instrument.

105. The system of claim 104, wherein said connector comprises one or more retractable pins adapted to be releasably inserted into corresponding openings on the instrument.

106. The system of claim 104, wherein the retractable pin comprises a threaded body disposed in a correspondingly threaded barrel or knob, and wherein turning of the body, barrel or knob advances or retracts the pin.

107. An adjustable frame assembly comprising:

(a) a substantially rigid frame having an instrument support section adapted for substantially rigid connection to surgical instruments;

(b) first and second substantially rigid supports extending at their proximal ends from said rigid frame;

(c) first and second side rail extensions that comprise table clamps adapted to attach said side rail extensions to the rails of a table and to lock the position of said side rail extensions relative to the table rails; and

(d) support clamps that connect the distal ends of said first and second supports to said first and second side rail extensions, respectively, such that the position of each of said supports relative to its respective said side rail extension can be changed and locked substantially along both the axis of said support and the axis of said side rail extension.

108. The adjustable frame assembly of claim 107, wherein said rigid frame further comprises first and second arms extending from said instrument support section and said first and second substantially rigid supports extend at their proximal ends from said first and second arms, respectively.

109. The adjustable frame assembly of claim 107, wherein said instrument support section is substantially parallel to said table.

110. The adjustable frame assembly of claim 107, wherein said supports comprise an axial offset.

111. An adjustable frame assembly comprising:

(a) a substantially rigid frame having an instrument support section adapted for substantially rigid connection to surgical instruments, wherein said frame defines a first plane;

(b) first and second substantially rigid supports extending at their proximal ends from said rigid frame, and including an axial offset along its length;

(c) first and second side rail extensions that comprise table clamps adapted to attach said side rail extensions to the rails of a table and to lock the

position of said side rail extensions relative to the table rails, wherein said table defines a second plane that is substantially parallel to said first plane; and

(d) support clamps that connect the distal ends of said first and second supports to said first and second side rail extensions, respectively, such that the position of each of said supports relative to its respective said side rail extension can be changed and locked in directions substantially parallel to substantially perpendicular to said first and second planes.

112. A clamp for securing an instrument to a support, comprising:

(a) a main body comprising:

(1) an upper side and a lower side, and two lateral sides;

(2) a first aperture extending between the two lateral sides and adapted to receive an instrument holder;

(3) a channel extending from the first aperture to the edge of the body along the lateral sides, and separating the main body into a first portion and a second portion;

(4) a groove in the lower side adapted to receive a support and a securing block;

(5) a second aperture extending between the upper and lower sides and adapted to receive a throughpin;

(b) a securing block positioned in the groove and comprising a threaded opening and a beveled side, wherein the beveled side of the securing block forms a support channel in the groove;

(c) a throughpin, rotatably disposed in the second aperture of the main body, comprising a threaded portion corresponding to and engaging the threaded opening of the securing block;

(d) an instrument holder, rotatably disposed in the first aperture, comprising an opening adapted to receive an instrument and a slot extending from the opening to the external surface of the instrument holder;

(e) wherein, when the throughpin is rotated in one direction, its threads urge the securing block against the lower side of the main body, simultaneously compressing the channel and constricting the first aperture, which in turn compresses the slot and constricts the opening of the instrument holder, and narrows the support channel.

113. The clamp of claim 112, further comprising a spring biasing the throughpin away from the securing block.

114. The clamp of claim 113, wherein the spring is a coil spring disposed in the second aperture, and wherein the throughpin passes through the coil spring.

115. A method for positioning surgical instruments relative to a reference line within a target location in a patient, comprising:

(a) determining the position of the reference line relative to a gravitational vector;

(b) determining a first point relative to a first plane intersecting the target location;

(c) using the first point to position an instrument that is adapted to locate a second plane intersecting the target location;

(d) positioning a fixture relative to the instrument;

(e) using a position locating device to align the fixture along the intersection of the first and second planes, wherein such intersection is substantially congruent with the reference line;

(f) securing the fixture in place; and

(g) using the fixture the position other instruments within the target location relative to the reference line.

116. The method of claim 115, wherein the determining a first point relative to a first plane further comprises:

(a) using at least two anatomical features to position a first instrument relative to the anatomical features; and

(b) marking the position of the instrument, and thereby indicating the first point.

117. The method of claim 116 wherein said first instrument comprises:

(a) a shaft having first and second ends;

(b) at least two extendable tips adapted to contact anatomical reference points, wherein the tips are located at the first end of the shaft;

(c) a member adapted to cooperate with a leveling device at the second end.

118. The method of claim 116 wherein said reference line is within a cervical intervertebral space and said anatomical features are the intersection between the bone of the uncinate processes and the annulus fibrosus on each side of the intervertebral space.

119. The method of claim 116 wherein the positioning the first instrument further comprises:

(a) rotating the first instrument through an arc within the first plane; and

(b) using a leveling device to determine the apogee of the arc.

120. The method of claim 115, wherein the using the first point to position an instrument that is adapted to locate a second plane further comprises:

(a) positioning the instrument relative to the first point;

(b) rotating the instrument through an arc, and thereby defining the second plane, wherein said second plane is substantially perpendicular to the first plane; and

(c) using a leveling device to position the instrument at the apogee of the arc, wherein the intersection of the first and second planes at said apogee is congruent with the reference line.

121. The method of claim 115, wherein the using a position locating device to align the fixture along the intersection of the first and second planes further comprises:

(a) removably placing the fixture over the instrument; and

(b) using a position locating device to adjust the position of the fixture to correspond to the pre-determined position of the reference line.

122. The method of claim 121 further comprising ensuring that the fixture is properly placed using a measuring gauge or a leveling device or both.

123. The method of claim 115, further comprising using an alignment block to secure the instrument and the fixture in relation to one another during the aligning the fixture along the intersection of the first and second planes.

124. The method of claim 115, wherein the securing the fixture in place comprises:

(a) aligning the fixture with the reference line such that the fixture provides an entryway into the target location, and the fixture can be used for positioning instruments within the target location relative to the reference line; and

(b) temporarily affixing the fixture using a fixation device.

125. The method of claim 124, wherein the target location is part of a spine and the temporarily affixing the fixture further comprises securing the fixture to a patient's vertebral bodies, drilling a receiving hole in the vertebral body, and inserting the fixation device through an aperture of the fixture and into the receiving hole.

126. The method of claim 124, wherein the temporarily affixing the fixture comprises securing the fixture to a brace.

127. The method of claim 126 wherein the brace is adapted to be secured to a rigid structure not secured to the patient.

128. A method for locating a preferred positioning for a prosthesis in a target implant location, comprising:

(a) locating a first plane within the target location in the transverse direction; and

(b) locating a second plane within the target location in the sagittal direction, wherein the first and second planes intersect to define a line along which a preferred position for locating the prosthesis can be determined.

129. The method of claim 128 further comprising positioning a fixture such that it is collinear with the line, and such that said fixture may be used to position instruments for preparation of the target location for implantation of the prosthesis at the preferred position.

130. The method of claim 128, wherein the locating the first second planes further comprises:

(a) using anatomical features as reference points to position a first tool to locate the first plane which defines the preferred transverse position for the center of the prosthesis;

(b) positioning a second tool with respect to the preferred transverse position; and

(c) using the second tool to locate the second plane which defines the preferred sagittal position for the center of the prosthesis , wherein the intersection of the preferred transverse position and the preferred sagittal position defines the line along which a preferred position for locating the center of the prosthesis can be determined.

131. The method of claim 130 wherein said anatomical features border the surgical site.

132. The method of claim 130 wherein said second tool is positioned with respect to the preferred transverse position by marking the preferred transverse position and using said mark to guide the positioning of the second tool.

133. The method of claim 130 wherein said first and second tools are the same instrument.

134. The method of claim 130 wherein the prosthesis is an intervertebral disc prosthesis and the preferred positioning of the center of the prosthesis is the lateral and caudal-cephalad anatomical center of the intervertebral disc space.

135. The method of claim 130 wherein the prosthesis is an intervertebral disc prosthesis and said method further comprises determining the preferred position for the center of the prosthesis by identifying a position along the line that positions the anterior edge of the prosthesis substantially tangent to the anterior edge of one of the adjacent vertebral bodies.

136. The method of claim 130 wherein the prosthesis is an intervertebral disc prosthesis and said method further comprises determining the preferred position for the center of the prosthesis by identifying a position along the line that positions the posterior edge of the prosthesis at least 1 mm anterior to the posterior edge of the disc space.

137. A system for positioning instruments within a patient's intervertebral disc space relative to a reference line, comprising:

(a) a first instrument for locating and marking a transverse center of the disc space;

(b) a second instrument for determining a sagittal center of the disc space that intersects with the transverse center;

(c) an angle orienting instrument for adjusting the second instrument to be collinear with the reference line, which is positioned at a pre-determined angle relative to a gravitational vector; and

(d) a machining fixture that is positioned with the second instrument relative to the reference line, and which is adapted to position additional instruments relative to the reference line.

138. A system for positioning instruments relative to a line during spinal surgery, comprising:

(a) a first instrument for determining a first point in a first plane and for indicating the position of the first point by marking a vertebral body;

(b) a second instrument adapted to be positioned relative to the mark for adapted for locating a second plane substantially perpendicular to the first plane, wherein the first and second planes intersect to form a line;

(c) a fixture adapted to be temporarily affixed to a vertebral body such that it is collinear with the reference line, and adapted to position site preparation instruments relative the line.

139. An instrument adapted to locate a position within a surgical site, comprising:

(a) a shaft having first and second ends;

(b) at least two extendable tips adapted to contact anatomical reference points, wherein the tips are located at the first end of the shaft;

(c) a member adapted to cooperate with a leveling device at the second end.

140. The instrument of claim 139 further comprising a marking device on the shaft.

141. The instrument of claim 139, wherein the shaft further comprises an adjustment portion to collapse and expand the tips.

142. The instrument of claim 139, wherein the shaft further comprises two arms adapted for tweezer-like motion.

143. The instrument of claim 139, further comprising two extensions having grasping surfaces, the extensions terminating at the tips and being hinged to the shaft at a fulcrum to provide movement of the tips.

144. The instrument of claim 139, wherein the marking device is selected from the group consisting of a spring loaded device, a push pin device, a sliding pin, a pointed pin, an anchor, a detachable device, a device that remains attached to the shaft, an ink marker, and a biocompatible dye marker.

145. The instrument of claim 139, wherein the instrument is for use during spinal surgery and wherein the two extendable tips are adapted to be inserted into a disc space.

146. The instrument of claim 139, wherein is the shaft is substantially centrally located between the ends of the expandable tips at all possible positions of the tips.

147. An instrument adapted to orient a fixture relative a skeletal joint, comprising:
(a) a handle having first and second ends;
(b) a nose at the first end adapted to be inserted into the joint;
(c) an interfacing structure adapted to cooperate with a corresponding interfacing structure of a machining fixture; and
(d) a leveling device at the second end.

148. The device of claim 147 further comprising a flange positioned adjacent the nose and adapted to control the insertion depth of the instrument.

149. The instrument of claim 147 wherein the leveling device is removably associated with the handle.

150. The instrument of claim 147, wherein the leveling device comprises a bubble level.

151. A system comprising the instrument of claim 147, and an orienting device that is adapted to interface with and assist with the proper positioning of the instrument relative to a gravitational vector, comprising:

(a) a measuring component having indicia marked thereon that corresponds to various positions relative to the gravitational vector;

(b) a connecting component that allows the orienting device to cooperate with the instrument when the instrument is positioned within a surgical site; and

(c) a leveling device associated therewith for determining the orienting device's position relative to the gravitational vector.

152. The system of claim 151 further comprising an alignment block, a fixture, or both that interface with and fit over the instrument, wherein said block or fixture comprises interfacing structure that allows the orienting device to cooperate with the instrument.

153. An orienting device that is adapted to interface with and assist with the proper positioning of a surgical instrument relative to a gravitational vector, comprising:

(a) a measuring component having indicia marked thereon that corresponds to various positions relative to the gravitational vector;

(b) a connecting component that allows the orienting device to cooperate with the instrument when the instrument is positioned within a surgical site; and

(c) a leveling device associated therewith for determining the orienting device's position relative to the gravitational vector.

154. A system for guiding site preparation instruments to a surgical site during spinal surgery, comprising:

(a) a set of locating instruments for locating a specific position of the surgical site into which a site preparation instrument is to be guided;

(b) a guiding structure adapted to be temporarily affixed to vertebral bodies to define the specific position located by the set of locating instruments, the guiding structure having a first set of features adapted to receive and guide a site preparation instrument; and

(c) a corresponding site preparation instrument having a second set of corresponding features, wherein the first set of features can be aligned with the second set of corresponding features in order to guide a site preparation instrument to the surgical site.

155. A machining fixture to position instruments relative to a surgical site, comprising:

(a) a base having at least one aperture adapted to receive a fixation device for securing the machining fixture in place;

(b) a torso extending from said base and having at least one slot therein adapted to cooperate with one or more structures on an instrument in order to control the positioning of the instrument relative to the surgical site; and

(c) an entryway adapted to receive the instrument.

156. The machining fixture of claim 155, further comprising an adjustable bushing movably positioned in an aperture in the base such that the bushing can be positioned in an extended position or a retracted position.

157. The machining fixture of claim 156 wherein the bushing is positioned within the aperture adapted to receive a fixation device, and wherein said bushing is adapted to receive the fixation device.

158. The machining fixture of claim 156 wherein the bushing is adapted to act as a guide to position a drill used to form a hole to receive the fixation device.

159. A machining fixture to position instruments relative to a surgical site, comprising:

(a) a base;

(b) a torso extending from said base;

(c) an entryway adapted to receive the instrument; and

(d) an adjustable bushing movably positioned in an aperture in the base such that the bushing can be positioned in an extended position or a retracted position to facilitate the stable positioning of the fixture relative to the surgical site.

160. The machining fixture of claim 159, wherein the adjustable bushing has a threaded outer portion and the bushing is positioned in a threaded aperture, and said bushing further comprises a head adapted to receive an instrument to rotate the bushing and thereby extend or retract the bushing.

161. The machining fixture of claim 159 wherein the surgical site is an intervertebral disc space and the bushing has a substantially flat lower surface adapted to contact a vertebral body when the bushing is in its extended position.

162. The machining fixture of claim 159 further comprising a lock to secure the bushing in an extended or retracted position.

163. The machining fixture of claim 162 wherein said lock comprises two plates that intersect the aperture in which the bushing is positioned, a locking screw engaging said plates, such that when the locking screw is rotated it forces the plates closer to one another.

164. The machining fixture of claim 155 further comprising openings adapted to secure the fixture to a brace.

165. The machining fixture of claim 155 further comprising a first and a second slot adapted to cooperate with the structures on the instrument in order to control the positioning of the instrument relative to the surgical site, wherein said first slot is substantially perpendicular to the second slot, and whereby said first and second slots are adapted to interface with first and second pins on the instrument, respectively.

166. The machining fixture of claim 155 further comprising a rotation facilitation section adapted to be secured to a brace to align the machining fixture in an angled position with respect to the surgical site.

167. A machining fixture to position instruments relative to a surgical site, comprising:

(a) a base;

(b) a torso extending from said base;

(c) an entryway adapted to receive an instrument; and

(d) a rotation facilitation section adapted to be secured to a brace to align the machining fixture in an angled position with respect to the surgical site.

168. The machining fixture of claim 167, wherein the machining fixture is adapted for use in preparing an intervertebral disc space to receive a prosthesis, and wherein the angled direction is any variation from a plane substantially parallel to the disc space.

169. The machining fixture of claim 167, wherein the rotation facilitation section comprises a slot that is of a shape selected from the group consisting of substantially V-shaped, substantially arc-shaped, substantially U-shaped, substantially a straight line, and substantially zig-zag-shaped.

170. The machining fixture of claim 167, wherein the rotation facilitation section comprises a position locator adapted to aid a surgeon in orienting the fixture in a specific position.

171. The machining fixture of claim 170 wherein the position locator is positioned to aid the surgeon in orienting the fixture at an angle of between about 0° and about 13° relative to the surgical site.

172. The machining fixture of claim 170, wherein the rotation facilitation section comprises a slot and wherein the position locator comprises a plurality of locators positioned along the slot, whereby said locators are selected from the group consisting of a detent, groove, notch, and threaded member.

173. The machining fixture of claim 170, wherein the position locator comprises indicia on the machining fixture.

174. The machining fixture of claim 167, further comprising an aperture in said base that is adapted to allow a fixation device inserted therein to at least partially protrude from the aperture when the machining fixture is in an angled position.

175. The machining fixture of claim 174 wherein said aperture comprises an axis and is partially open along the axis.

176. The machining fixture of claim 174, wherein said aperture comprises an axis and is elongated in the direction perpendicular to the axis.

177. A system including the machining fixture of claim 167 and a fixation device for securing the machining fixture to the surgical site, wherein the fixation device comprises:

(a) a threaded lower portion; and

(b) an upper portion adapted to engage a locking mechanism.

178. The system of claim 177 wherein the fixation device further comprises a flexible middle portion positioned between the lower portion and the upper portion.

179. The system of claim 177 further comprising a locking mechanism comprising:

(a) a lower portion adapted to be securely positioned on the upper portion of the fixation device;

(b) a flexible portion connected to the lower portion; and

(c) a handle connected to the flexible portion.

180. The system of claim 179 wherein said lower portion of said locking mechanism is a threaded nut and said upper portion of said fixation device is a threaded post.

181. The machining fixture of claim 155, wherein the torso comprises at least two slots extending between the entryway and the base, wherein said slots are angled relative to the axis of the fixture in the direction extending from the entryway to the base.

182. A machining fixture to position instruments relative to a surgical site, comprising:

(a) a base;

(b) an entryway adapted to receive the instrument.

(c) a torso extending from said base having at least two slots extending between the entryway and the base, wherein said slots are angled relative to the axis of the fixture in the direction extending from the entryway to the base.

183. The machining fixture of claim 182, wherein at least two slots are positioned in a mirror relationship with respect to one another.

184. The machining fixture of claim 182, wherein the slots are positioned at an angle ranging from about 0° to about 13° relative to an axis of the fixture.

185. The machining fixture of claim 155, further comprising a pivot joint between the base and the torso.

186. The machining fixture of claim 185 wherein said pivot joint is an arcuate interface.

187. A system including the machining fixture of claim 155 and an alignment block adapted to cooperate with the entryway of the machining fixture, the alignment block comprising:

(a) a securing portion for orienting the alignment block with respect to the machining fixture; and

(b) at least one aperture for receiving an aligning instrument.

188. The system of claim 187, wherein the alignment block further comprises at least one aperture for receiving instrumentation for placement of the fixation device.

189. The machining fixture of claim 155 further comprising an adjustable mounting device for positioning and locking the machining fixture with respect to a fixation device.

190. A machining fixture to position instruments relative to a surgical site, comprising:

(a) a base;

(b) a torso extending from said base;

(c) an entryway adapted to receive the instrument; and

(d) an adjustable mounting device located near the base for positioning and locking the machining fixture with respect to a fixation device.

191. The machining fixture of claim 190, wherein the adjustable mounting device comprises a movable base positioned on mounting members, and the movable base has an open portion adapted to receive the fixation device.

192. The machining fixture of claim 191, wherein the mounting members are pins and the movable base is slideably mounted thereon.

193. The machining fixture of claim 191, wherein said movable base's position is biased by a spring, and said fixture further comprises a position locker to secure the movable base in position.

194. A method of adjusting the position of a machining fixture relative to a gravitational vector in order to prepare vertebral bodies to receive an implant within the intervertebral disc space therebetween, comprising:

(a) determining the position of anatomical features of the vertebral bodies or the intervertebral space relative to a gravitational vector;

(b) inserting a first end of a positioning instrument into the intervertebral disc space such that a second end of the instrument extends outside the intervertebral disc space;

(c) positioning the machining fixture over the second end of the instrument; and

(d) adjusting the position of the fixture based on the position of the anatomical features relative to the gravitational vector.

195. The method of claim 194 wherein the adjusting the position of the fixture based on the position of the anatomical features is done using a position locating device, comprising:

(a) a measuring component having position indicia marked thereon; and

(b) a connecting component that allows a position locating device to cooperate with the fixture.

196. The method of claim 194 wherein the position of the anatomical features relative to a gravitational vector is the angle of such features relative to the gravitational vector, and wherein the position of the fixture is adjusted such that an axis of the fixture is a substantially positioned at the same angle relative to the gravitational vector as the anatomical features.

197. The method of claim 194 wherein the anatomical feature is a line normal to a line connecting the posterior inferior edge of the vertebral body caudal to the disc space and the posterior superior edge of the vertebral body cephalad to the disc space.

198. The method of claim 194 wherein the anatomical feature is the plane of the intervertebral disc space.

199. A method for preparing a target space within a patient to receive a prosthesis, comprising:

(a) positioning the patient on a surface;

(b) locating an angled relation of the target space relative to the surface;

(c) providing a reference frame assembly on the surface;

(d) determining the approximate center of the target space in at least two dimensions; comprising:

i) locating the approximate transverse center of the target space;

ii) locating the approximate sagittal center of the target space; and

iii) marking the intersection of the transverse and sagittal centers; and

(e) positioning and securing a site preparation fixture relative to the intersection, wherein the fixture is adapted to receive site preparation instruments.

200. The method of claim 199, further comprising:

(a) using the fixture to orient site preparation instruments and prepare the target space.

201. The method of claim 199, wherein the target space is a location between two vertebral bodies and further comprising:

(a) preparing the endplate of each vertebral body so that it corresponds to a surface of the prosthesis; and

(b) implanting the prosthesis in the target space.

202. A method for locating a preferred implant location for a spinal intervertebral disc prosthesis and for preparing the spinal disc space for receiving the prosthesis, comprising:

(a) determining an angle that defines the relation of the disc space relative to a gravitational vector;

(b) stabilizing a frame over a general area of the disc space using an operating room table as a fixed base;

(c) determining a preferred transverse position for locating the prosthesis within the disc space using a transverse positioning tool;

(d) marking the preferred transverse position of the disc space;

(e) determining the preferred sagittal position for locating the prosthesis within the disc space, comprising:

(1) aligning a sagittal positioning tool with respect to the marked transverse position;

(2) determining the preferred location of the sagittal positioning tool, which is the location at which an axis of the sagittal positioning tool is at an angle relative to the gravitational vector that is substantially equal to the angle that defines the relation of the disc space relative to a gravitational vector;

(f) orienting a guide with respect to the preferred location of the sagittal positioning tool such that an axis of the guide is substantially parallel to said axis of the sagittal positioning tool;

(g) anchoring the guide to the frame and to the vertebral bodies bordering the disc space; and

(h) inserting site preparation tools through the guide to prepare the disc space for receiving a prosthesis, wherein the guide interfaces with the site preparation tools to control their position relative to the disc space and the adjacent vertebral bodies.

203. The method of claim 202 further comprising using a bubble level in cooperation with the transverse and sagittal positioning tools to locate the preferred positions for said tools.

204. The method of claim 202 wherein the guide has a connecting interface that corresponds to a connecting interface of the sagittal positioning tool and of the site preparation tools.

205. The method of claim 202, wherein the guide is anchored to the frame using clamps and anchored to the disc space by screws inserted at holes at a base of the guide.

206. A method for positioning surgical instruments within a target location in a patient, comprising:

(a) using a leveling device in association with an instrument inserted into the target location to locate first and second points relative to the target location, wherein said first and second points define a reference line;

(b) positioning a fixture relative to the reference line; and

(c) using the fixture to position surgical instruments within the target location.

207. The method of claim 206 wherein an image of the target location is first made to determine the theoretical position of the reference line relative to a gravitational vector.

208. The method of claim 206 wherein the first point is located by:

(a) using at least two anatomical features to position an instrument within the target location;

(b) using a level to align the axis of the instrument with a gravitation vector along a first direction;

(c) selecting the first point along the axis of the instrument.

209. The method of claim 208 wherein said first direction is in the transverse direction.

210. The method of claim 208 further comprising indicating the position of the first point by placing a mark on an anatomical structure adjacent the instrument after the axis of the instrument has been aligned with the gravitational vector.

211. The method of claim 210 wherein said mark is used to position a second instrument within the target location, and a level is used to align the axis of the second instrument with a gravitational vector along a second direction, wherein following such alignment the axis of the second instrument defines the reference line.

212. The method of claim 211 wherein said first direction is in the transverse direction and the second direction is in the sagittal direction.

213. A method for confirming a correct position of a machining fixture relative to a patient's vertebral bodies during spinal surgery, comprising:

(a) aligning an alignment block with respect to the fixture, the alignment block having at least one centering aperture;

(b) inserting a gauge having a pre-determined marking through said centering aperture wherein one end of the gauge contacts a vertebral body and another end of the gauge extends from the centering aperture; and

(c) ensuring that the marking is properly oriented in relation to the centering aperture.

214. A system for confirming a correct position of a machining fixture relative to a patient's vertebral bodies during spinal surgery, comprising:

(a) an alignment block adapted to be aligned with and placed at an entryway of the fixture, the alignment block having at least one aperture; and

(b) a gauge having at least one pre-determined marking, the gauge adapted to be inserted through said aperture such that one end of the gauge contacts a vertebral body and another end of the gauge extends from the aperture, wherein the at least one marking indicates if the machining fixture is properly positioned relative to the patient's vertebral bodies.

215. A multi-function wrench for adjusting an adjustable bushing wherein the adjustable bushing comprises a shaped head that can be engaged to extend or retract the adjustable bushing, the wrench comprising:

(a) a shaft with a first end having a corresponding shape to engage the shaped head of the adjustable guide; and

(b) a second end sized to measure a distance between distracted vertebral bodies.

216. The multi-function wrench of claim 215, wherein the second end of the wrench has at least one portion that is 8.5 mm.

217. A system for machining the space between bones of a joint, comprising:

(a) a milling tool, comprising:

(1) a power source attachment located at a distal end of the milling tool;

(2) a longitudinally extending barrel having first and second transverse guide blocks adapted to interact with a machining fixture to limit the longitudinal position and rotational or translational movement of the milling tool; and

(3) a milling head located at the proximal end of the milling tool, adapted for at least partial insertion into the space between bones of a joint and adapted to contact the bones of the joint upon rotation about a pivot point or translation, the milling head comprising:

(i) a cutting head drive adapted to rotate a cutting head around an axis substantially perpendicular to the axis of the longitudinally extending barrel; and

(ii) a cutting blade disposed on the cutting head, comprising a base disk, a radially extending cutting flute, and at least one opening in the base disk adapted to allow cooling fluids to contact the bone and remove debris.

218. The system of claim 217, wherein the milling head comprises between one and four radially extending cutting flutes.

219. The system of claim 217, wherein the second guide block limits the longitudinal position of the milling head within the space between bones of the joint.

220. The system of claim 217, wherein the first guide block limits the rotational or translational movement of the milling head .

221. The system of claim 217, wherein the second guide block limits the longitudinal position of the milling head within the space between bones of the joint, and the first guide block limits the rotational movement of the milling head about a pivot point located at or near the second guide block, whereby the second guide block is positioned proximate to the first guide block along the barrel.

222. The system of claim 217, wherein the longitudinally extending barrel has a variable length.

223. The system of claim 217, wherein the axis of the milling head is at an angle relative to the axis of the longitudinally extending barrel, and wherein the axis of rotation of the cutting head is perpendicular to the axis of the milling head.

224. The system of claim 223, wherein the angle is between about 3° and about 10° relative to the axis of the longitudinally extending barrel.

225. The system of claim 217, further comprising:

(a) a machining fixture adapted to receive and guide the milling tool, comprising:

(1) a first stop adapted to cooperate with the first guide block of the milling tool to limit the rotational motion of the milling tool about a pivot point; and

(2) a second stop adapted to cooperate with the second guide block of the milling tool to limit the longitudinal position of the milling tool within the space between the bones of the joint.

226. The system of claim 225, wherein the second guide block is positioned proximate to the first guide block along the barrel.

227. The system of claim 225, further comprising:

(a) a milling depth gauge, comprising:

(1) a shaft having a first end and a second end;

(2) a transverse saddle disposed on the second end of the shaft and adapted to receive the second guide block of the milling tool and to cooperate with the second stop of the machining fixture;

(3) a rod movably associated with the shaft and extendible therefrom, comprising a foot located at an end of the rod, and a contacting portion disposed on the foot; and

(4) an adjustable locking portion adapted to secure the degree of extension of the extendible rod.

228. The system of claim 227 wherein said shaft is hollow and said rod is slideably positioned within said hollow shaft.

229. The system of claim 227 wherein said first end is the distal end and said second end is the proximal end.

230. The system of claim 225, further comprising a transverse burring system, comprising:

(a) a burring block adapted to cooperate with the machining fixture, comprising a distal threaded portion having an opening therein, and a proximal portion having an anterior-posterior positioning stop adapted to position a burring tool in the anterior-posterior direction and a lateral positioning stop adapted to limit lateral movement of the burring tool;

(b) a burring adjustment ring, comprising an opening surrounded by a threaded portion corresponding to the threaded portion of the burring block, and a proximal edge adapted to cooperate with the machining fixture;

(c) wherein when the burring adjustment ring is turned relative to the burring block, the burring block is raised or lowered relative to the machining fixture.

231. The system of claim 230, further comprising:

(a) a burring tool comprising:

(1) a power source attachment located at a distal end of the burring tool;

(2) a longitudinally extending barrel having a positioning portion having first and second stops adapted to interact with the anterior-posterior positioning stop and the lateral positioning stop of the burring block to limit anterior-posterior position and lateral movement of the burring tool;

(3) a rotatable burring shaft disposed within the longitudinally extending barrel and extending from the proximal end thereof, and comprising a burring blade at its proximal end.

232. The system of claim 231, wherein the centerline of the positioning portion is coincident with the centerline of the longitudinally extending barrel.

233. The system of claim 231, wherein the centerline of the positioning portion is offset with respect to the centerline of the longitudinally extending barrel.

234. The system of claim 231, further comprising:

(a) a burring depth gauge, comprising:

(1) a body having a proximal end and a distal end;

(2) a positioning portion disposed on the shaft, comprising a positioning stop adapted to interact with the anterior-posterior positioning stop of the burring block;

(3) a shaft movably associated with the body and extendable therefrom; and

(4) an adjustable locking portion adapted to secure the degree of extension of the extendible shaft.

235. The system of claim 234 wherein said body is hollow, and said shaft is slideably positioned within said hollow body and is extendable from an opening in the proximal end of the body.

236. A milling depth gauge, comprising:

(a) a shaft having a proximal end and a distal end;

(b) a transverse saddle disposed on the shaft and adapted to receive a guide block of a milling tool and to cooperate with a stop of a machining fixture;

(c) a rod movably associated with the shaft and extendable therefrom, said rod comprising a foot located at a proximal end of the rod, and a contacting portion disposed on the foot; and

(d) an adjustable locking portion adapted to secure the degree of extension of the extendible rod.

237. The system of claim 236 wherein said shaft is hollow, and said rod is slideably positioned within said hollow shaft and is extendable from an opening in the proximal end of the shaft.

238. A transverse burring system, comprising:

(a) a burring block adapted to cooperate with a supporting instrument to limit the size and shape of tissue removed from a joint, comprising:

(1) a distal threaded portion having an opening therein; and

(2) a proximal portion having an anterior-posterior positioning stop adapted to position a burring tool in the anterior-posterior direction and a lateral positioning stop adapted to limit lateral movement of the burring tool;

(b) a burring adjustment ring, comprising an opening surrounded by a threaded portion corresponding to the threaded portion of the burring block, and a proximal edge adapted to cooperate with the supporting instrument;

(c) wherein when the burring adjustment ring is turned relative to the burring block, the burring block is raised or lowered relative to the supporting instrument.

239. The system of claim 238 wherein the supporting instrument is a machining fixture.

240. A burring tool comprising:

(a) a power source attachment located at a distal end of the burring tool;

(b) a longitudinally extending barrel having a positioning portion having first and second stops adapted to interact with an anterior-posterior positioning stop and a lateral positioning stop of a burring block to limit longitudinal position and rotational movement of a burring tool;

(c) a rotatable burring shaft disposed within the longitudinally extending barrel and extending from the proximal end thereof, and comprising a burring blade at its proximal end.

241. The burring tool of claim 240, wherein the centerline of the positioning portion is coincident with the centerline of the longitudinally extending barrel.

242. The burring tool of claim 240, wherein the centerline of the positioning portion is offset with respect to the centerline of the longitudinally extending barrel.

243. A burring depth gauge, comprising:

(a) a body having a proximal end and a distal end;

(b) a positioning portion disposed on the body, comprising a positioning stop adapted to interact with an anterior-posterior positioning stop of a burring block;

(c) a shaft movably associated with the body and extendable therefrom; and

(d) an adjustable locking portion adapted to secure the degree of extension of the extendible shaft.

244. The gauge of claim 243 wherein said body is hollow, and said shaft is slideably positioned within said hollow body and is extendable from an opening in the proximal end of the body.

245. A system for separating and maintaining separation of the bones of a joint, comprising:

(a) a distractor comprising a proximal end, a distal end, and an intermediate length, wherein:

(1) the proximal end comprises:

(i) a substantially blunt, substantially flat, longitudinally extending blade adapted for insertion into the joint, the blade comprising a

leading edge, a first and second opposed face, and opposed lateral edges; and

(ii) a laterally projecting stop located at a distal end of the blade and adapted to contact one or more joint surfaces and limit the penetration of the blade into the joint;

(2) the distal end comprises:

(i) a handle extending substantially orthogonal to the intermediate length, and adapted for gripping and turning;

(b) wherein when the handle is turned, the opposed lateral edges of the blade bear against the bones of a joint and force them apart.

246. The system of claim 245, further comprising a retaining spacer, wherein the retaining spacer comprises:

(a) a heel having first and second edges, adapted for insertion into the distracted joint, wherein the first and second edges contact the bones of the joint and maintain their distance apart when the distractor is removed.

247. The system of claim 246, wherein at least one of the first and second edges are serrated.

248. The method of claim 92 further comprising distracting the vertebral bodies sequentially using a plurality of distractors of increasing widths on opposite lateral sides of the target disc space, wherein each of said plurality of distractors comprises a base having a longitudinally extending flat blade portion that is adapted to extend into the target disc space, and a laterally projecting stop that is adapted to contact the outer surface of the vertebral body when said blade portion is inserted into the target disc space.

249. The distractor of claim 245 wherein the distance between the lateral edges is 4.5 mm, 6.5 mm, and 8.5 mm.

250. A method for distracting vertebral bodies that are adjacent an intervertebral disc space comprising:

(a) forming a first cavity within a first vertebral body endplate adjacent the disc space;

(b) forming a second cavity within a second vertebral body endplate adjacent the disc space;

(c) positioning a profile-matching distractor within said first and second cavities, wherein said profile-matching distractor comprises first and second discs, and said first disc has a segment whose geometry approximately matches the geometry of at least a portion of said first cavity, and said second disc has a segment whose geometry approximately matches the geometry of at least a portion of said second cavity.

251. The method of claim 250 wherein said first disc has substantially the same geometry as said first cavity, and said second disc has substantially the same geometry as said second cavity.

252. The method of claim 250 wherein said profile-matching distractor further comprises:

(a) a handle having a base portion and first and second extensions that extend from said base portion, wherein said first and second extensions are attached to said first and second discs, respectively, and said first and second discs comprise tapered cavities in their facing surfaces;

(b) an actuating nut rotatably mounted on the base portion and having a threaded opening therein;

(c) an actuating shaft having a conically tapered end and a threaded end, wherein the actuating shaft is positioned between said first and second extensions such that the threaded end is positioned within the threaded opening of the actuating nut and the tapered end is positioned within said tapered cavities of said first and second discs;

(d) wherein as said actuating nut is rotated, the tapered end of the actuating shaft translates longitudinally, and as the enlarged portion of the taper moves out of the tapered cavities and the first and second discs are pushed away from one another.

253. A profile-matching distractor comprising:

(a) first and second discs;

(b) a handle having a base portion and first and second extensions that extend from said base portion, wherein said first and second extensions are attached to said first and second discs, respectively, and said first and second discs comprise tapered cavities in their facing surfaces;

(c) an actuating nut rotatably mounted on the base portion and having a threaded opening therein;

(d) an actuating shaft having a conically tapered end and a threaded end, wherein the actuating shaft is positioned between said first and second extensions such that the threaded end is positioned within the threaded opening of the actuating nut and the tapered end is positioned within said tapered cavities of said first and second discs;

(e) wherein as said actuating nut is rotated, the tapered end of the actuating shaft translates longitudinally, and as the enlarged portion of the taper moves out of the tapered cavities the first and second discs are pushed away from one another.

254. A skeletal joint distractor comprising

(a) first and second tubes adapted to receive first and second anchors, respectively, that are positioned within tissue adjacent said joint;

(b) a first arm having a distal end attached to said first tube and a second arm having a distal end attached to said second tube, wherein said first and second arms are movably connected to one another such said distal ends of said arms can be moved relative to each other;

(c) an adjuster that controls the movement of said first and second arms relative to each other.

255. The distractor of claim 254 wherein said adjuster is an adjusting screw threadably attached to said first arm and rotatably attached to said second arm.

256. The distractor of claim 255 wherein said first arm and said second arm are pivotably attached to one another between said distal ends and said adjusting screw.

257. An instrument for inserting a skeletal joint prosthesis into a joint space, wherein said prosthesis comprises at least two holder openings, said instrument comprising:

(a) a locking arm ;

(b) at least two fingers extending from a distal end of said locking arm , and adapted to cooperate with said holder openings in the prosthesis; and

(c) an ejector movably mounted between said fingers having a pushing surface that can be positioned distal to said fingers and proximal to said fingers .

258. A method of inserting a prosthesis into a target intervertebral space comprising:

(a) forming a first cavity within a first vertebral body endplate adjacent the disc space;

(b) forming a second cavity within a second vertebral body endplate adjacent the disc space;

(c) positioning a profile-matching distractor within said first and second cavities, wherein said profile-matching distractor comprises first and second discs , and said first disc has a segment whose geometry approximately matches the geometry of a portion of said first cavity, and said second disc has a segment whose geometry approximately matches the geometry of a portion of said second cavity;

(d) positioning a tubular distractor on first and second anchors extending from the adjacent vertebral bodies, wherein said tubular distractor comprises: (1) first and second tubes adapted to receive said anchors, (2) a first arm having a distal end attached to said first tube and a second arm having a distal end attached to said second tube, wherein said first and second arms are movably connected to one another such said distal ends of said arms can be moved relative to each other, and (3) an adjuster that controls the movement of said first and second arms relative to each other.

(e) removing said profile-matching distractor from the disc space;

(f) inserting said prosthesis into the disc space; and

(g) removing said tubular distractor.

259. The method of claim 258 wherein said prosthesis comprises at least two holder openings and said prosthesis is inserted by:

(a) attaching the prosthesis to an insertion instrument having (1) a locking arm , (2) at least two fingers extending from a distal end of said locking arm , and adapted to cooperate with said holder openings in the prosthesis,

and (3) an ejector movably mounted between said fingers having a pushing surface that can be positioned distal to said fingers and proximal to said fingers ;

(b) inserting the prosthesis into the disc space; and

(c) actuating the ejector to move the pushing surface distal to said fingers and thereby release said prosthesis from said fingers.

260. A method of implanting an intervertebral disc prosthesis into an intervertebral disc space of a patient comprising:

(1) determining the appropriate size prosthesis;

(2) taking an orientation image of the spine in the area of the target intervertebral disc space with a gravity direction indicator visible in the image field;

(3) quantifying the relationship between the orientation of the spine and a gravitational vector shown by the gravity direction indicator visible on the image;

(4) distracting the target disc space;

(5) using a transverse positioning tool to locate the preferred transverse position for the center of the prosthesis;

(6) using the preferred transverse position to position a sagittal positioning tool;

(7) aligning a fixture over the sagittal positioning tool 250;

(8) using the quantified relationship between the orientation of the spine and the gravitational vector to adjust the position of the

sagittal positioning tool and fixture to a preferred sagittal position for the center of the prosthesis;

(9) securing fixture to the vertebral bodies;

(10) using the fixture to position machining instruments and machining cavities into the endplates adjacent the target disc space; and

(11) inserting the prosthesis into the machined cavities.

261. The method of claim 260 further comprising positioning the patient prior to taking the image of the spine such that the spine approximates its neutral position.

262. The method of claim 260 further comprising taking a preliminary anterior-posterior image of the spine to ensure the proper positioning of the spinous processes.

263. The method of claim 262 further comprising positioning the patient prior to taking the orientation image such that spinous processes are as close to midway between the facets as possible as shown on the anterior-posterior image of the spine.

264. The method of claim 260 wherein said orientation image is a lateral radiograph.

265. The method of claim 260 further comprising attaching an adjustable frame assembly 20 above the target disc space and using the frame assembly to secure the position of the fixture.

266. The method of claim 265 wherein the frame is attached to the operating table.

267. The method of claim 260 further comprising inserting a retractor blade 82 near the level of the target space to retract soft tissue surrounding the target space.

268. The method of claim 267 wherein the soft tissue includes each of the longus colli muscles, and the trachea.

269. The method of claim 260 further comprising removing a portion of the target disc prior to distracting the target disc space.

270. The method of claim 260 wherein the distraction of the target disc space is done using distractors of increasing widths to distract the vertebral bodies adjacent the target disc space to expose the target space.

271. The method of claim 260 further comprising marking the preferred transverse position on a vertebral body and using the mark to position the sagittal positioning tool.

272. The method of claim 260 wherein the aligning the fixture over the sagittal positioning tool comprises fitting a key on the fixture into a keyway on the sagittal positioning tool.

273. The method of claim 260 further comprising placing an alignment block over the fixture and sagittal positioning tool to align their positions relative to one another.

274. The method of claim 260 further comprising loosely bracing the scaffold with a scaffold brace either before or after the placement of the alignment block .

275. The method of claim 260 wherein the quantified relationship is a spine orientation angle that is equal to the angle between an anatomic reference line and the gravitational vector, and the using the quantified relationship to position the sagittal positioning tool comprises positioning the sagittal positioning tool such that the angle of the sagittal positioning tool's axis relative to the gravitational vector is equal to the spine orientation angle.

276. The method of claim 275 where the anatomic reference line is a line normal to a line connecting the posterior inferior edge of the vertebral body caudal to the target disc space and the posterior superior edge of the vertebral body cephalad to the target disc space.

277. The method of claim 260 wherein the using the quantified relationship to position the sagittal positioning tool comprises using a protractor to position the sagittal positioning tool and the fixture.

278. The method of claim 260 further comprising placing an alignment block over the fixture and sagittal positioning tool to align their positions relative to one another, and wherein the using the quantified relationship to position the sagittal positioning tool comprises positioning a protractor over the alignment block , fixture , sagittal positioning tool combination in order to position the fixture .

279. The method of claim 278 further comprising removing the sagittal positioning tool , protractor , and alignment block from the fixture after the fixture has been secured to the vertebral bodies.

280. The method of claim 260 further comprising determining and locating a preferred anterior-posterior position for the prosthesis which defines where the cavities in the vertebral body endplates should be formed.

281. The method of claim 260 wherein said cavities are formed using a machining element having a machining surface that corresponds to the size and shape of an outer surface of the prosthesis.

282. The method of claim 260 further comprising performing a preliminary machining operation prior to forming the cavities in the endplates, wherein said preliminary machining operation comprises removing tissue from within the target disc space to provide a space therein for insertion of a cavity forming machining instrument.

283. The method of claim 282 wherein said preliminary machining operation comprises a central machining operation and two offset machining operations.

284. The method of claim 282 further comprising verifying the posterior limit for the preliminary machining operation.

285. The method of claim 282 wherein said preliminary machining operation is performed using a burring support system comprising a burring adjustment ring and a burring block , and said method further comprises inserting the burring support system into the fixture.

286. The method of claim 260 wherein the determining the appropriate size of a prosthesis to be implanted into a target intervertebral disc space comprises:

(a) making an image of the endplates of the vertebral bodies adjacent said target disc space;

(b) approximating from said image which endplate has the smallest surface area; and

(c) selecting a prosthesis that will substantially cover the endplate having the smallest surface area.

287. The method of claim 260 wherein said gravity direction indicator comprises a weighted radio-opaque pendulum pivotably mounted within at least a partial housing such that the indicator's position within the housing will change as its orientation relative to gravity changes.

288. The method of claim 265 wherein said adjustable frame comprises:

(a) a substantially horizontal rectangular open frame adapted to be positioned over an operating area and to support surgical instruments, having two substantially horizontal lateral side portions, a substantially horizontal cephalad portion, and a substantially horizontal caudal portion;

(b) two laterally extending side arms, each having a proximal end adapted to connect to at least one side of the open frame and a distal end adapted to connect to a vertically extending rod;

(c) two vertically extending rods, each having a proximal end adapted to connect to one distal end of a side arm, and a distal end adapted to be engaged by a clamp;

(d) two clamps, each adapted to releasably engage one distal end of a vertically extending rod and releasably engaging a rail or rail extension of an operating table.

289. The method of claim 260 wherein said transverse positioning tool comprises:

(a) a shaft having first and second ends;

(b) at least two extendable tips adapted to contact anatomical reference points, wherein the tips are located at the first end of the shaft;

(c) a member adapted to cooperate with a leveling device at the second end.

290. The method of claim 260 wherein said sagittal positioning tool comprises:

(a) a handle having first and second ends;

(b) a nose at the first end adapted to be inserted into the joint;

(c) an interfacing structure adapted to cooperate with a corresponding interfacing structure of a machining fixture; and

(d) a leveling device at the second end.

291. The method of claim 260 wherein an orienting device is used to locate the preferred sagittal position, and said orienting device comprises:

(a) a measuring component having indicia marked thereon that corresponds to various positions relative to the gravitational vector;

(b) a connecting component that allows the orienting device to cooperate with the sagittal positioning tool when the sagittal positioning tool is positioned within the disc space; and

(c) a leveling device associated therewith for determining the orienting device's position relative to the gravitational vector.

292. The method of claim 260 wherein said fixture comprises:

(a) a base having at least one aperture adapted to receive a fixation device for securing the fixture in place;

(b) a torso extending from said base and having at least one slot therein adapted to cooperate with structure on an instrument in order to control the positioning of the instrument relative to the surgical site; and

(c) an entryway adapted to receive the instrument.

293. The method of claim 260 wherein said fixture comprises:

(a) a base;

(b) a torso extending from said base;

(c) an entryway adapted to receive an instrument; and

(d) a rotation facilitation section adapted to be secured to a brace to align the fixture in an angled position with respect to the surgical site.

294. The method of claim 260 wherein the fixture is secured to the vertebral bodies using a fixation device comprising:

(a) a threaded lower portion

(b) a flexible portion connected to the lower portion; and

(c) an upper portion adapted to engage a locking mechanism.

295. The method of claim 177 wherein said fixation device is secured using a locking mechanism comprising:

(a) a lower portion adapted to be securely positioned on the upper portion of the fixation device;

(b) a flexible portion connected to the lower portion; and

(c) a handle connected to the flexible portion.

296. The method of claim 260 wherein said fixture comprises:

(a) a base;

(b) an entryway adapted to receive an instrument.

(c) a torso extending from said base having at least two slots extending between the entryway and the base, wherein said slots are angled relative

to the axis of the fixture in the direction extending from the entryway to the base.

297. The method of claim 260 wherein an alignment block is used to align the fixture over the sagittal positioning tool, wherein said alignment block comprises:

(a) a securing portion for orienting the alignment block with respect to the fixture; and

(b) at least one aperture for receiving an aligning instrument.

298. The method of claim 260 wherein said fixture comprises:

(a) a base;

(b) a torso extending from said base;

(c) an entryway adapted to receive an instrument; and

(d) an adjustable mounting device located near the base for positioning and locking the machining fixture with respect to a fixation device.

299. The method of claim 260 wherein a milling tool is used to form the cavities in the vertebral body endplates, said milling tool comprising:

(1) a power source attachment located at a distal end of the milling tool;

(2) a longitudinally extending barrel having first and second transverse guide blocks adapted to interact with a machining fixture to limit the longitudinal position and rotational or translational movement of the milling tool; and

(3) a milling head located at the proximal end of the milling tool, adapted for at least partial insertion into the space between bones of a joint and adapted to contact the bones of the joint upon rotation about a pivot point or translation, the milling head comprising:

(i) a cutting head drive adapted to rotate a cutting head around an axis substantially perpendicular to the axis of the longitudinally extending barrel; and

(ii) a cutting blade disposed on the cutting head.

300. The method of claim 280 wherein a milling depth gauge is used to determine the preferred anterior-posterior position, and said gauge comprises:

(a) a shaft having a proximal end and a distal end;

(b) a transverse saddle disposed on the shaft and adapted to receive a guide block of a milling tool and to cooperate with a stop of a machining fixture;

(c) a rod movably associated with the shaft and extendable therefrom, said rod comprising a foot located at a proximal end of the rod, and a contacting portion disposed on the foot; and

(d) an adjustable locking portion adapted to secure the degree of extension of the extendible rod.

301. The method of claim 282 wherein said preliminary machining operation is done using a transverse machining system, comprising:

(a) a block adapted to cooperate with a supporting instrument to limit the size and shape of tissue removed from a joint, comprising:

(1) a distal threaded portion having an opening therein; and

(2) a proximal portion having an anterior-posterior positioning stop adapted to position a burring tool in the anterior-posterior direction and a lateral positioning stop adapted to limit lateral movement of the tool;

(b) an adjustment ring, comprising an opening surrounded by a threaded portion corresponding to the threaded portion of the block, and a proximal edge adapted to cooperate with the supporting instrument;

(c) wherein when the adjustment ring is turned relative to the block, the block is raised or lowered relative to the supporting instrument.

302. The method of claim 282 wherein said preliminary machining operation is done using a tool comprising:

(a) a power source attachment located at a distal end of the tool;

(b) a longitudinally extending barrel having a positioning portion having first and second stops adapted to interact with an anterior-posterior positioning stop and a lateral positioning stop of a block to limit longitudinal position and rotational movement of a tool;

(c) a rotatable shaft disposed within the longitudinally extending barrel and extending from the proximal end thereof, and comprising a blade at its proximal end.

303. The method of claim 282 wherein the posterior limit of said preliminary machining operation is determined using a burring depth gauge, comprising:

(a) a body having a proximal end and a distal end;

(b) a positioning portion disposed on the body, comprising a positioning stop adapted to interact with an anterior-posterior positioning stop of a block;

(c) a shaft movably associated with the body and extendable therefrom; and

(d) an adjustable locking portion adapted to secure the degree of extension of the extendible shaft.

304. The method of claim 260 where the distracting the target disc space is done using a system for separating and maintaining separation of the bones of a joint, comprising:

(a) a distractor comprising a proximal end, a distal end, and an intermediate length, wherein:

(1) the proximal end comprises:

(i) a blunt, flat, longitudinally extending blade adapted for insertion into the joint, the blade comprising a leading edge, a first and second opposed face, and opposed lateral edges; and

(ii) a laterally projecting stop located at a distal end of the blade and adapted to contact one or more joint surfaces and limit the penetration of the blade into the joint;

(2) the distal end comprises:

(i) a handle extending substantially orthogonal to the intermediate length, and adapted for gripping and turning;

(b) wherein when the handle is turned, the opposed lateral edges of the blade bear against the bones of a joint and force them apart.

305. The method of claim 260 wherein the machining the cavities comprises:

(a) forming a first cavity within a first vertebral body endplate adjacent the disc space;

(b) forming a second cavity within a second vertebral body endplate adjacent the disc space;

(c) positioning a profile-matching distractor within said first and second cavities, wherein said profile-matching distractor comprises first and second discs , and said first disc has a segment whose geometry approximately matches the geometry of a portion of said first cavity, and said second disc has a segment whose geometry approximately matches the geometry of a portion of said second cavity.

306. The method of claim 250 wherein a skeletal joint distractor is used to maintain the position of the vertebrae upon removing the profile-matching distractor, wherein said skeletal joint distractor comprises:

(a) first and second tubes adapted to receive first and second anchors, respectively that are positioned within tissue adjacent said joint;

(b) a first arm having a distal end attached to said first tube and a second arm having a distal end attached to said second tube, wherein said first and

second arms are movably connected to one another such said distal ends of said arms can be moved relative to each other;

(c) an adjuster that controls the movement of said first and second arms relative to each other.

307. The method of claim 260 wherein said prosthesis comprises at least two holder openings, and said prosthesis is inserted into the machined cavities with an instrument comprising:

(a) a locking arm ;

(b) at least two fingers extending from a distal end of said locking arm , and adapted to cooperate with said holder openings in the prosthesis; and

(c) an ejector movably mounted between said fingers having a pushing surface that can be positioned distal to said fingers and proximal to said fingers .

308. A method of implanting a spinal intervertebral disc prosthesis into an intervertebral disc space of a patient comprising:

(1) determining the appropriate size prosthesis;

(2) positioning the patient on the operating table such that the spine approximates its neutral position ;

(3) immobilizing the patient on the operating table;

(4) taking a lateral image of the spine in the area of the target intervertebral space with gravity direction indicator visible in the image field;

(5) quantifying the relationship between the orientation of the spine and a gravitational vector shown by the gravity direction indicator

visible on the image, wherein the quantified relationship is a spine orientation angle that is equal to the angle between an anatomic reference line and the gravitational vector;

(6) attaching an adjustable frame assembly 20 above the target disc space, wherein the frame is attached to the operating table;

(7) retracting soft tissue surrounding the target space;

(8) removing a portion of the target disc;

(9) distracting the target disc space by using distractors 140 of increasing widths to distract the vertebral bodies adjacent the target disc space to expose the target space;

(10) using a transverse positioning tool to locate the preferred transverse positioning for the center of the prosthesis;

(11) marking the preferred transverse position on a vertebral body;

(12) using the preferred transverse position to position a sagittal positioning tool;

(13) aligning a fixture 300 over the sagittal positioning tool 250;

(14) placing an alignment block over the fixture and sagittal positioning tool to align their positions relative to one another;

(15) loosely bracing the fixture with a brace either before or after the placement of the alignment block ;

(16) positioning a protractor over the alignment block , fixture , and sagittal positioning tool combination, and using the protractor to position the fixture such that the angle of the sagittal positioning tool's axis relative to the gravitational vector is equal to the spine orientation angle;

(17) securing the fixture to the vertebral bodies;

(18) removing the sagittal positioning tool , protractor , and alignment block from the fixture ;

(19) determining and locating a preferred anterior-posterior position for the prosthesis which defines where cavities in the vertebral body endplates should be formed;

(20) performing a preliminary machining operation comprising removing tissue from within the target disc space to provide a space therein for insertion of a cavity forming machining instrument;

(21) machining the endplates to form said cavities therein; and

(22) inserting the prosthesis into said cavities.

309. A method for determining the relation of the anatomical features relative to gravity, comprising:

(a) locating a line connecting two anatomical features within the surgical site; and

(b) measuring the angle between the line connecting the anatomical features and a reference line defining the direction of gravity.

310. The method of claim 309, wherein the determining the relation of the anatomical features relative to gravity further comprises:

(a) providing an image of a patient's intervertebral space into which the spinal prosthesis will be placed, wherein the image has a reference point located thereon;

(b) locating the center of the space using anatomical features;

(c) aligning a first measuring device with the center of the space;

(d) aligning a second measuring device with the reference point; and

(e) determining the angle between the first and second measuring devices.

311. The method of claim 1, wherein the size of said prosthesis is selected such that when the prosthesis is positioned within the disc space the posterior margin of the prosthesis is positioned at the posterior margin of each adjacent vertebral body endplate.

312. A method of implanting a intervertebral disc prosthesis into a patient's disc space defined by two endplates, wherein said prosthesis comprises two opposing articulating members and said prosthesis has a neutral position defined by the midpoint of its range of motion, said method comprising:

(a) determining the position of a first target endplate when the spine is in its neutral position;

(b) preparing the first endplate to receive one of the articulating members, such that when one of the articulating members is received by the first endplate, the prosthesis substantially assumes its neutral position when the patient's spine assumes its neutral position.

313. A method of implanting a intervertebral disc prosthesis into a patient's disc space defined by first and second endplates, wherein said prosthesis comprises first and second articulating members, said method comprising:

(a) determining a first angle (α) that is the angle of the first target endplate relative to a reference plane when the spine is in its neutral position;

(b) determining a second angle (β) that is the angle of said first target endplate relative to said reference plane;

(c) forming a first cavity within said first target endplate by inserting a machining element into the target disc space and bringing the machining element into contact with the first endplate, wherein the angle of the machining element upon insertion relative to the reference plane is equal to $\beta - \alpha + \delta$, wherein δ is equal to any rotation of the machining element that is needed to bring the machining element into contact with the first endplate; and

(d) positioning said first articulating member within said first cavity.

314. The method of claim 54, wherein the first and second target endplates are distracted before determining said second angle (β).

315. The method of claim 85, wherein the first and second target endplates are distracted before determining said second angle (β).

316. A method of implanting a first intervertebral disc prosthesis in a first intervertebral disc space of a patient and implanting a second intervertebral disc prosthesis in a second intervertebral disc space of the patient, wherein the first and second disc spaces are adjacent and are separated by a linking vertebral body, comprising:

(1) positioning a first fixture relative to the first disc space;

(2) securing the first fixture's position by attaching a fixation device to the first fixture and the linking vertebral body;

(3) using the first fixture to position at least one instrument within the first disc space to prepare the first disc space to receive the first prosthesis;

(4) detaching the first fixture from the fixation device while leaving the fixation device attached to the linking vertebral body;

(5) positioning a second fixture relative to the second disc space;

(6) securing the second fixture's position by attaching the fixation device to the second fixture; and

(7) using the second fixture to position at least one instrument within the second disc space to prepare the second disc space to receive the second prosthesis.

317. The method of claim 316 wherein the first and second fixtures are the same instrument.

318. The method of claim 316 wherein the second fixture comprises:

(a) a base;

(b) a torso extending from said base;

(c) an entryway adapted to receive the instrument; and

(d) an adjustable mounting device located near the base for positioning and locking the fixture with respect to the fixation device.

319. The method of claim 318, wherein the adjustable mounting device comprises a movable base positioned on mounting members, and the movable base has an open portion adapted to receive the fixation device.

320. The method of claim 319, wherein the mounting members are pins and the movable base is slideably mounted thereon.

321. The machining fixture of claim 319, wherein said the position of said movable base is biased by a spring, and said fixture further comprises a position locker to secure the movable base in position.

322. The method of claim 316 wherein said fixation device comprises:

(a) a threaded lower portion;

(b) an upper portion adapted to engage a locking mechanism; and

(c) a flexible middle portion positioned between the lower portion and the upper portion.

323. A method of implanting a first intervertebral disc prosthesis in a first intervertebral disc space of a patient and implanting a second intervertebral disc prosthesis in a second intervertebral disc space of the patient, wherein the first and second disc spaces are adjacent and are separated by a linking vertebral body, comprising:

(1) positioning a first fixture relative to the first disc space;

(2) securing the first fixture's position by attaching a fixation device to the first fixture and the linking vertebral body, wherein the fixation device comprises a threaded lower portion that is threaded into the linking vertebral body and an upper portion adapted to extend through an aperture in the fixture and engage a locking mechanism;

(3) using the first fixture to position at least one instrument within the first disc space to prepare the first disc space to receive the first prosthesis;

(4) removing the first fixture from the upper portion of the fixation device, while leaving the lower portion of the fixation device threaded into the linking vertebral body;

(5) positioning a second fixture relative to the second disc space, wherein said second fixture comprises a movable base having an open portion adapted to receive the upper portion of the fixation device;

(6) securing the second fixture's position by moving the movable base to capture the upper portion of the fixation device in the open portion of the movable base and securing a locking mechanism to the fixation device; and

(7) using the second fixture to position at least one instrument within the second disc space to prepare the second disc space to receive the second prosthesis.

324. A method of implanting a second intervertebral disc prosthesis in a second intervertebral disc space of a patient, wherein the second intervertebral disc space is adjacent to a first intervertebral disc space having a first prosthesis previously implanted therein, and said first and second disc spaces are separated by a linking vertebral body, comprising:

(1) positioning a fixation device in an opening in the linking vertebral body, wherein said opening was initially formed to position an instrument for use in implanting the first prosthesis;

(2) positioning a fixture relative to the second disc space, wherein said second fixture comprises a movable base having an open portion adapted to receive a portion of the fixation device;

(3) securing the second fixture's position by moving the movable base to capture the fixation device in the open portion of the movable base and securing a locking mechanism to the fixation device; and

(4) using the second fixture to position at least one instrument within the second disc space to prepare the second disc space to receive the second prosthesis.

325. The method of claim 324 wherein the fixation device is positioned in the linking vertebral body after the fixture is positioned relative to the second disc space.

326. The method of claim 324 wherein said first and second prostheses are implanted during a single surgery.

327. The method of claim 324 wherein said first and second prostheses are implanted during different surgeries.

328. The method of claim 54 wherein said target disc space is in the lumbar spine and the angle of the machining element upon insertion relative to the reference plane is between about 0° + δ to and about 19° + δ.

329. The method of claim 328 wherein said target disc space is at lumbar level L1-L2 and the angle of the machining element upon insertion relative to the reference plane is between about 7.4° + δ to and about 9.6° + δ.

330. The method of claim 329 wherein the angle of the machining element upon insertion relative to the reference plane is about 8.5° + δ.

331. The method of claim 328 wherein said target disc space is at lumbar level L2-L3 and the angle of the machining element upon insertion relative to the reference plane is between about 8.4° + δ to and about 11.6° + δ.

332. The method of claim 331 wherein the angle of the machining element upon insertion relative to the reference plane is about 10° + δ.

333. The method of claim 328 wherein said target disc space is at lumbar level L3-L4 and the angle of the machining element upon insertion relative to the reference plane is between about 10.4° + δ to and about 13.8° + δ.

334. The method of claim 333 wherein the angle of the machining element upon insertion relative to the reference plane is about 12.1° + δ.

335. The method of claim 328 wherein said target disc space is at lumbar level L4-L5 and the angle of the machining element upon insertion relative to the reference plane is between about 11.2° + δ to and about 16.4° + δ.

336. The method of claim 335 wherein the angle of the machining element upon insertion relative to the reference plane is about 13.8° + δ.

337. The method of claim 328 wherein said target disc space is at lumbar level L5-S1 and the angle of the machining element upon insertion relative to the reference plane is between about 12.4° + δ to and about 19° + δ.

338. The method of claim 337 wherein the angle of the machining element upon insertion relative to the reference plane is about 15.7° + δ.